

What is claimed is:

1. A transgenic plant comprising a recombinant polynucleotide having a nucleotide sequence selected from the group:
  - (a) a nucleotide sequence encoding a polypeptide comprising an amino acid sequence selected from those of SEQ ID NOs.: 2N where N= 1-258, or a complementary nucleotide sequence thereof;
  - (b) a nucleotide sequence encoding a polypeptide comprising a conservatively substituted variant of a polypeptide of (a);
  - (c) one of SEQ ID NOs.: 2N-1 where N=1-258, or a complementary nucleotide sequence thereof;
  - (d) a nucleotide sequence comprising one or more silent substitutions in a nucleotide sequence of (c);
  - (e) a nucleotide sequence that hybridizes under stringent conditions to a nucleotide sequence of one or more of: (a), (b), (c), or (d);
  - (f) a nucleotide sequence comprising at least 15 consecutive nucleotides outside of a conserved domain of any of (a)-(e);
  - (g) a nucleotide sequence comprising a subsequence or fragment of any of (a)-(f), which subsequence or fragment encodes a polypeptide that modifies one or more of a plant's traits;
  - (h) a nucleotide sequence having at least 31% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (i) a nucleotide sequence having at least 60% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (j) a nucleotide sequence having at least 95% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (k) a nucleotide sequence encoding a polypeptide having at least 31% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
  - (l) a nucleotide sequence encoding a polypeptide having at least 60% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258; or
  - (m) a nucleotide sequence encoding a polypeptide having at least 75% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;

- (n) a nucleotide sequence encoding a polypeptide having at least 95% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (o) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least 86% sequence identity to a conserved domain of a polypeptide of one of SEQ ID Nos: 2N where N=1-258;
- (p) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 90% sequence identity to a conserved domain of a polypeptide of one of SEQ ID Nos: 2N where N=1-258;
- (q) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 95% sequence identity to a conserved domain of a polypeptide of one of SEQ ID Nos: 2N where N=1-258;
- (r) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 98% sequence identity to a conserved domain of a polypeptide of one of SEQ ID Nos: 2N where N=1-258;
- (s) a nucleotide sequence encoding a polypeptide having at least 31% sequence identity over the entire length of a polypeptide of one of SEQ ID Nos.: 2N where N=1-258;
- (t) a nucleotide sequence encoding a polypeptide having at least 60% sequence identity over the entire length of a polypeptide of one of SEQ ID Nos.: 2N where N=1-258;
- (u) a nucleotide sequence encoding a polypeptide having at least 75% sequence identity over the entire length of a polypeptide of one of SEQ ID Nos. 2N where N=1-258;
- (v) a nucleotide sequence encoding a polypeptide having at least 95% sequence identity over the entire length of a polypeptide of one of SEQ ID Nos. 2N where N=1-258,

wherein the plant possesses an altered trait as compared to a wild type or reference plant, or the plant exhibits an altered phenotype as compared to a wild type or reference plant, or the plant exhibits ectopic expression or altered expression of one or more genes associated with a plant trait as compared to a wild type plant.

2. The transgenic plant of claim 1, further comprising a constitutive, inducible, or tissue-specific promoter operably linked to said recombinant nucleotide.
3. The transgenic plant of claim 1, wherein the plant is selected from the following group: soybean, wheat, corn, potato, cotton, rice, oilseed rape, sunflower, alfalfa, sugarcane, turf,

banana, blackberry, blueberry, strawberry, raspberry, cantaloupe, carrot, cauliflower, coffee, cucumber, eggplant, grapes, honeydew, lettuce, mango, melon, onion, papaya, peas, peppers, pineapple, *Arabidopsis*, spinach, squash, sweet corn, tobacco, tomato, watermelon, mint and other labiates, rosaceous fruits, and vegetable brassicas.

4. An isolated or recombinant polynucleotide having a nucleotide sequence selected from the following:
  - (a) a nucleotide sequence encoding a polypeptide comprising a sequence selected from those of SEQ ID Nos: 2N where N=1-258, or a complementary nucleotide sequence thereof;
  - (b) a nucleotide sequence encoding a polypeptide comprising a conservatively substituted variant of a polypeptide of (a);
  - (c) one of SEQ ID NOs. 2N-1 where N=1-258, or a complementary nucleotide sequence thereof;
  - (d) a nucleotide sequence comprising silent substitutions in a nucleotide sequence of (c);
  - (e) a nucleotide sequence that hybridizes under stringent conditions to a nucleotide sequence of one or more of: (a), (b), (c), or (d);
  - (f) a nucleotide sequence comprising at least 15 consecutive nucleotides outside of a conserved domain of any of (a)-(e);
  - (g) a nucleotide sequence comprising a subsequence or fragment of any of (a)-(f), which subsequence or fragment encodes a polypeptide that modifies one or more of a plant's traits;
  - (h) a nucleotide sequence having at least 31% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (i) a nucleotide sequence having at least 60% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (j) a nucleotide sequence having at least 95% sequence identity to a nucleotide sequence of any of (a)-(g);
  - (k) a nucleotide sequence encoding a polypeptide having at least 31% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
  - (l) a nucleotide sequence encoding a polypeptide having at least 60% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258; or
  - (m) a nucleotide sequence encoding a polypeptide having at least 75% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;

- (n) a nucleotide sequence encoding a polypeptide having at least 95% sequence identity outside of a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (o) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least 86% sequence identity to a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (p) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 90% sequence identity to a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (q) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 95% sequence identity to a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258; and
- (r) a nucleotide sequence encoding a polypeptide having an amino acid domain with at least about 98% sequence identity to a conserved domain of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (s) a nucleotide sequence encoding a polypeptide having at least 31% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (t) a nucleotide sequence encoding a polypeptide having at least 60% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (u) a nucleotide sequence encoding a polypeptide having at least 75% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258;
- (v) a nucleotide sequence encoding a polypeptide having at least 95% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258.

5. The isolated or recombinant polynucleotide of claim 4, further comprising a constitutive, inducible, or tissue-specific promoter operably linked to the polynucleotide nucleotide.

6. An isolated or recombinant polypeptide comprising a subsequence of at least about 15 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4.

7. A method of using the isolated or recombinant polynucleotide of claim 4 for producing a plant having a modified trait, the method comprising selecting a polynucleotide that encodes a polypeptide, inserting the polynucleotide into an expression vector, introducing the vector into a plant or a cell of a plant to overexpress the polypeptide, thereby producing a modified plant, and selecting for a modified trait.

8. The transgenic plant of claim 1, wherein the trait is selected from the group: enhanced tolerance to freezing; enhanced tolerance to chilling; enhanced tolerance to heat; enhanced tolerance to drought; enhanced tolerance to water saturation; enhanced tolerance to radiation; enhanced tolerance to ozone; enhanced tolerance to microbial disease; enhanced tolerance to fungal disease; enhanced tolerance to viral disease; enhanced tolerance to pest infestation; decreased herbicide sensitivity; enhanced tolerance to heavy metals; enhanced ability to take up heavy metals; and enhanced growth under poor photoconditions.

9. The transgenic plant of claim 1, wherein the trait is an alteration in the level of one or more of the compounds selected from the group: taxol, tocopherol, tocotrienol, sterols, phytosterols, vitamins, wax monomers, anti-oxidants, amino acids, lignins, cellulose, tannins, prenillipids, glucosinolates, and terpenoids.

10. The transgenic plant of claim 1, wherein the trait is an alteration in one or more physical characteristics selected from the group: number of trichomes; fruit and seed size and number; yield of stems; yield of leaves; yield of roots; stability of seeds during storage; susceptibility of the seed to shattering; root hair length; root hair quantity; internode distances; and the quality of seed coat.

11. The transgenic plant of claim 1, wherein the trait is an alteration in a plant growth characteristic selected from the group: growth rate; germination rate of seeds; vigor of plants; vigor of seedlings; leaf senescence; flower senescence; male sterility; apomixis; flowering time; flower abscission; rate of nitrogen uptake; biomass; transpiration characteristics; apical dominance; branching pattern; number of organs; organ identity; organ shape; and organ size.

12. The transgenic plant of claim 1, wherein the trait is an alteration in one or more characteristics selected from the group: protein production; oil production; seed protein

production; seed oil production; insoluble sugar level; soluble sugar level; and starch composition.

13. The method of claim 7, wherein the trait is selected from the group: enhanced tolerance to freezing; enhanced tolerance to chilling; enhanced tolerance to heat; enhanced tolerance to drought; enhanced tolerance to water saturation; enhanced tolerance to radiation; enhanced tolerance to ozone; enhanced tolerance to microbial disease; enhanced tolerance to fungal disease; enhanced tolerance to viral disease; enhanced tolerance to pest infestation; decreased herbicide sensitivity; enhanced tolerance to heavy metals; enhanced ability to take up heavy metals; and enhanced growth under poor photoconditions.

14. The method of claim 7, wherein the trait is an alteration in the level of one or more of the compounds selected from the group: taxol, tocopherol, tocotrienol, sterols, phytosterols, vitamins, wax monomers, anti-oxidants, amino acids, lignins, cellulose, tannins, prenillipids, glucosinolates, and terpenoids.

15. The method of claim 7, wherein the trait is an alteration in one or more physical characteristics selected from the group: number of trichomes; fruit and seed size and number; yield of stems; yield of leaves; yield of roots; stability of seeds during storage; susceptibility of the seed to shattering; root hair length; root hair quantity; internode distances; and the quality of seed coat.

16. The method of claim 7, wherein the trait is an alteration in a plant growth characteristic selected from the group: growth rate; germination rate of seeds; vigor of plants; vigor of seedlings; leaf senescence; flower senescence; male sterility; apomixis; flowering time; flower abscission; rate of nitrogen uptake; biomass; transpiration characteristics; apical dominance; branching pattern; number of organs; organ identity; organ shape; and organ size.

17. The method of claim 7, wherein the trait is an alteration in one or more characteristics selected from the group: protein production; oil production; seed protein production; seed oil production; insoluble sugar level; soluble sugar level; and starch composition.

18. A plant produced by the method of claim 13.

19. A plant produced by the method of claim 14.
20. A plant produced by the method of claim 15.
21. A plant produced by the method of claim 16.
22. A plant produced by the method of claim 17.
23. A method of using the isolated or recombinant polynucleotide of claim 4 for producing a plant having a modified trait, the method comprising selecting a polynucleotide that when expressed produces an antisense nucleic acid, inserting the polynucleotide into an expression vector, introducing the vector into a plant or a cell of a plant to express the antisense nucleic acid, thereby producing a modified plant, and selecting for a modified trait.
24. The method of claim 23, wherein the trait is selected from the group: enhanced tolerance to freezing; enhanced tolerance to chilling; enhanced tolerance to heat; enhanced tolerance to drought; enhanced tolerance to water saturation; enhanced tolerance to radiation; enhanced tolerance to ozone; enhanced tolerance to microbial disease; enhanced tolerance to fungal disease; enhanced tolerance to viral disease; enhanced tolerance to pest infestation; decreased herbicide sensitivity; enhanced tolerance to heavy metals; enhanced ability to take up heavy metals; and enhanced growth under poor photoconditions.
25. The method of claim 23, wherein the trait is an alteration in the level of one or more of the compounds selected from the group: taxol, tocopherol, tocotrienol, sterols, phytosterols, vitamins, wax monomers, anti-oxidants, amino acids, lignins, cellulose, tannins, prenyl lipids, glucosinolates, and terpenoids.
26. The method of claim 23, wherein the trait is an alteration in one or more physical characteristics selected from the group consisting of: the number of trichomes, fruit and seed size and number, yield of stems, leaves, or roots, stability of seeds during storage, susceptibility of the seed to shattering, root hair length and quantity, internode distances, or the quality of seed coat.
27. The method of claim 23, wherein the trait is an alteration in a plant growth characteristic selected from the group: growth rate; germination rate of seeds; vigor of plants; vigor of

seedlings; leaf senescence; flower senescence; male sterility; apomixis; flowering time; flower abscission; rate of nitrogen uptake; biomass; transpiration characteristics; apical dominance; branching pattern; number of organs; organ identity; organ shape; and organ size.

28. The method of claim 23, wherein the trait is an alteration in one or more characteristics selected from the group: protein production; oil production; seed protein production; seed oil production; insoluble sugar level; soluble sugar level; and starch composition.

29. A plant produced by the method of claim 24.

30. A plant produced by the method of claim 25.

31. A plant produced by the method of claim 26.

32. A plant produced by the method of claim 27.

33. A plant produced by the method of claim 28.

34. An isolated or recombinant polypeptide comprising a subsequence of at least about 10 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are outside of a conserved domain.

35. An isolated or recombinant polypeptide comprising a subsequence of at least about 20 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are outside of a conserved domain.

36. An isolated or recombinant polypeptide comprising a subsequence of at least about 30 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are outside of a conserved domain.

37. An isolated or recombinant polypeptide comprising a subsequence of at least about 10 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are within a conserved domain.



38. An isolated or recombinant polypeptide comprising a subsequence of at least about 20 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are within a conserved domain.
39. An isolated or recombinant polypeptide comprising a subsequence of at least about 30 contiguous amino acids encoded by the recombinant or isolated polynucleotide of claim 4, wherein the contiguous amino acids are within a conserved domain.
40. An isolated or recombinant polypeptide having at least 31% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258, or the length of the polypeptide itself.
41. An isolated or recombinant polypeptide having at least 60% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258, or the length of the polypeptide itself.
42. An isolated or recombinant polypeptide having at least 75% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258, or the length of the polypeptide itself.
43. An isolated or recombinant polypeptide having at least 95% sequence identity over the entire length of a polypeptide having an amino acid sequence of one of SEQ ID Nos.: 2N where N=1-258, or the length of the polypeptide itself.
44. An isolated or recombinant polynucleotide having the sequence one of SEQ ID NOs.: 2N-1 where N=1-258, or a complementary nucleotide sequence thereof..
45. The polynucleotide of claim 44, which has the sequence of one of SEQ ID Nos.: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, or 37.
46. The polynucleotide of claim 44, which has the sequence of one of SEQ ID Nos.: 53, 79, 81, 107, 125, 153, 167, 203, 223, 289, 285, or 287.

47. The polynucleotide of claim 44, which has the sequence of one of SEQ ID Nos.: 345, 365, 447, 469, 477, 505, 507, 509, 511, or 513.
48. A computer readable medium having stored sequence information comprising the polynucleotide sequence of claim 44.
49. The computer readable medium of claim 48, having stored sequence information comprising the sequence of one of SEQ ID Nos.: 1-37.
50. The computer readable medium of claim 48, having stored sequence information comprising the sequence of one of SEQ ID Nos.: 53, 54, 79, 80, 81, 82, 107, 108, 125, 126, 153, 154, 167, 168, 203, 204, 223, 224, 289, 290, 285, 286, 287, or 288.
51. The computer readable medium of claim 48, having stored sequence information comprising the polynucleotide sequence of one of SEQ ID Nos.: 345, 346, 365, 366, 447, 448, 469, 470, 477, 478, 505, 506, 507, 508, 509, 510, 511, 512, 513, or 514.
52. A method of identifying a homolog sequence from a database comprising a plurality of known plant sequences, the method comprising: inputting sequence information selected from one or more of SEQ ID Nos. 1-516; and querying the database to identify a homolog sequence.
53. The method of claim 52, wherein the database being queried comprises a database of known genomic, cDNA, EST, or protein sequences.
54. The method of claim 52, wherein inputting sequence information comprises copying the sequence information from a CD.
55. The method of claim 52, wherein the sequence data comprises one of SEQ ID Nos.: 1-37.
56. The method of claim 52, wherein the sequence data comprises one of SEQ ID Nos.: 53, 54, 79, 80, 81, 82, 107, 108, 125, 126, 153, 154, 167, 168, 203, 204, 223, 224, 289, 290, 285, 286, 287, or 288.

57. The method of claim 52, wherein the sequence data comprises of SEQ ID Nos.: 345, 346, 365, 366, 447, 448, 469, 470, 477, 478, 505, 506, 507, 508, 509, 510, 511, 512, 513, or 514.
58. The method of claim 52, wherein the sequence data comprises a 20 nucleotide region or 6 amino acid region of one of SEQ ID Nos.: 1-37.
59. The method of claim 52, wherein the sequence data comprises a 20 nucleotide region or 6 amino acids region one of SEQ ID Nos.: 53, 54, 79, 80, 81, 82, 107, 108, 125, 126, 153, 154, 167, 168, 203, 204, 223, 224, 289, 290, 285, 286, 287, or 288.
60. The method of claim 52, wherein the sequence data comprises a 20 nucleotide region or 6 amino acid region of one of SEQ ID Nos.: 345, 346, 365, 366, 447, 448, 469, 470, 477, 478, 505, 506, 507, 508, 509, 510, 511, 512, 513, or 514.
61. A homolog identified by the method of claim 52.
62. The homolog of claim 61, identified by the method of claim 53.
63. The homolog of claim 61, identified by the method of claim 54.
64. The homolog of claim 61, identified by the method of claim 55.
65. The homolog of claim 61, identified by the method of claim 55.
66. The homolog of claim 61, identified by the method of claim 56.
67. The homolog of claim 61, identified by the method of claim 57.
68. The homolog of claim 61, identified by the method of claim 58.
69. The homolog of claim 61, identified by the method of claim 59.
70. The homolog of claim 61, identified by the method of claim 60.